IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No: 09/797,606	Attorney Docket Number: 10001436-1
Filed: January 22, 2001	
	Group Art Unit: 2527
Inventor: Kenneth Smith	
	Examiner: B. Hoffman
Title: Method Of Maintaining Integrity Of An Instruction Or Data Set	

October 1, 2004

DECLARATION UNDER 37 C.F.R. § 1.131

I, Kenneth Smith, make the following declaration.

1.   I am the inventor of subject matter claimed in the above captioned patent application

2.   The claimed subject matter was conceived before December 24, 1999 as documented in the Invention Disclosure No. 10001436 I submitted in December 1999. A copy of the Invention Disclosure No. 10001436 is attached to this Declaration as Exhibit A.
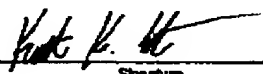
I declare that all statements made in this Declaration of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the patent application or any patent issued on that application.

_____   _____
Date   Kenneth Smith

Declaration of Kenneth Smith
Serial No. 09/797,606   -1-

HEWLETT PACKARD **INVENTION DISCLOSURE**

PDNO	1000 1436	DATE RCVD	12-14-99

PAGE ONE OF 4

ATTORNEY LGM ISW

Instructions: The information contained in this document is COMPANY CONFIDENTIAL and may not be disclosed to others without prior authorization. Submit this disclosure to the HP Legal Department as soon as possible. No patent protection is possible until a patent application is authorized, prepared, and submitted to the Government.

Descriptive Title of Invention:

An apparatus to protect an instruction or data set from malicious or unintentional modification. (CodeSafe)

RECEIVED

DEC 14 1999

Name of Project:

Kingfisher

H.P. BOISE LEGAL

Product Name or Number:

Kingfisher

Was a description of the invention published, or are you planning to publish? If so, the date(s) and publication(s):

NO

Was a product including the invention announced, offered for sale, sold, or is such activity proposed? If so, the date(s) and location(s):

Yes, Kingfisher products should reach market sometime in 2002

Was the invention disclosed to anyone outside of HP, or will such disclosure occur? If so, the date(s) and name(s):

NO

If any of the above situations will occur within 3 months, call your IP attorney or the Legal Department now at 1-896-4919 or 970-896-4919.

Was the invention described in a lab book or other record? If so, please identify (lab book #, etc.)

Yes, Ken Smith Lab Book Dated 12/8/99

Was the invention built or tested? If so, the date:

No

Was this invention made under a government contract? If so, the agency and contract number:

No

Description of Invention: *Please preserve all records of the invention and attach additional pages for the following. Each additional page should be signed and dated by the inventor(s) and witness(es).*

A.   Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).
B.   Problems solved by the invention.
C.   Advantages of the invention over what has been done before.
D.   Description of the construction and operation of the invention (include appropriate schematic, block, & timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc.)

Signature of Inventor(s): Pursuant to my (our) employment agreement, I (we) submit this disclosure on this date: [12/13/1999   ].

Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name
358885	Kenneth Smith		396-5062	534	ISW / Lab
Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name
Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name
Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name

(If more than four inventors, include additional information on another copy of this form and attach to this document)

Form 3.1 IDF.DOC Rev. 10/25/99

EXHIBIT A TO
SMITH DECLARATION

INVENTION DISCLOSURE   COMPANY CONFIDENTIAL   PAGE 2 OF 4

HEWLETT PACKARD

Signature of Witness(es): *(Please try to obtain the signature of the person(s) to whom invention was first disclosed.)*

The invention was first explained to, and understood by, me (us) on this date: [12 / 13 / 1999]

Full Name	Signature	Date of Signature
Laura Karine Johnson	*Karine Johnson*	12-13-99
Wendy Lynn Zerza	*Wendy Zer*	12/13/99

Inventor & Home Address Information: *(If more than four Inventors, include addt'l information on a copy of this form & attach to this document)*

Inventor's Full Name		
Kenneth Kay Smith		

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City	State	Zip
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Do you have a Residential P.O. Address? P.O. BOX	City	State	Zip

Greeted as (nickname, middle name, etc.)	Citizenship
Ken	U.S.

Inventor's Full Name		

Street		

City	State	Zip

Do you have a Residential P.O. Address? P.O. BOX	City	State	Zip

Greeted as (nickname, middle name, etc.)	Citizenship

Inventor's Full Name		

Street		

City	State	Zip

Do you have a Residential P.O. Address? P.O. BOX	City	State	Zip

Greeted as (nickname, middle name, etc.)	Citizenship

Inventor's Full Name		

Street		

City	State	Zip

Do you have a Residential P.O. Address? P.O. BOX	City	State	Zip

Greeted as (nickname, middle name, etc.)	Citizenship

Form 3.1 IDF.DOC Rev. 10/25/99

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K.K-S.

Additional information for CodeSafe

Invention Description:
An apparatus to protect an instruction or data set from malicious or unintentional modification. (CodeSafe)

A.   Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).

When a system utilizes modifiable memory (most typically FLASH), the memory can be modified by the system at any time. The typical solution to ensure that an "update" is performed correctly is to run an error control code (an example is to use a Cyclic Redundancy Code or CRC). This works fairly well to ensure within reasonable probability that the code image downloaded to the machine matched the original. However, there is no protection from a malicious modification or even an unintentional modification.

B.   Problems solved by the invention.

This invention solves the problem of malicious modification. It also solves the problem of unintentional modification.

C.   Advantages of the invention over what has been done before.

By utilizing a hardware defined one-way function, the code loaded into the machine can be known with far greater probability to be a "correct" image. Also, a malicious modification of the code is not allowed. The one-way function is kept as a company secret, and the function is never revealed through operation of the machine – therefore it cannot be duplicated. Unintentional modification of the code is protected in the same manner.

D.   Description of the construction and operation of the invention (include appropriate schematic, block, & timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc.)

Detailed description of the invention:

There are two ways in which this invention could be implemented:

Implementation A:

The system is comprised of three major elements:
1-   Modifiable Memory
2-   Memory Controller Mechanism
3-   Microprocessor

The information loaded into the modifiable memory will be called the "image" and "key".
When a software developer generates a new image, the developer runs the image through a "one-way function", thus creating the key. This one-way function is kept company secret.
The Memory controller contains the same one-way function as the software developer.
Before any instructions are passed to the microprocessor, the memory controller mechanism reads in the entire image, processes the one-way function on the image, and compares the resultant key with the key stored in the modifiable memory. If these keys fail to match, then some "safe" set of code is executed which would request a new image be loaded into the machine, and warn the operator of possible malicious

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K.K.S.

modification to the machine's instruction set. This safe code could exist as either non-modifiable MASK ROM, or as a block of the modifiable memory which has been hardware protected to not allow modification.

Implementation B:

The system is comprised of three major elements:
1- Modifiable Memory
2- Memory Controller Mechanism
3- On-chip non-modifiable memory
4- Microprocessor

Similar to implementation A, the information loaded into the modifiable memory will be called the "image" and "key".

When a software developer generates a new image, the developer runs the image through a "one-way function", thus creating the key. This one-way function is kept company secret.

In this implementation, however, the memory controller contains a special purpose processor whose algorithm is contained in the on-chip non-modifiable memory. The algorithm in this memory is not accessible to the main microprocessor. This algorithm implements the same one-way function as the software developer.

Before any instructions are passed to the microprocessor, the memory controller's special purpose processor reads in the entire image, processes the one-way function on the image, and compares the resultant key with the key stored in the modifiable memory. If these keys fail to match, then some "safe" set of code is executed which would request a new image be loaded into the machine, and warn the operator of possible malicious modification to the machine's instruction set. This safe code could exist as either non-modifiable MASK ROM, or as a block of the modifiable memory which has been hardware protected to not allow modification.

The advantage of implementation B over implementation A is that the algorithm for the one-way function could be very complex. Therefore a complete hardware implementation of such could be costly. The difficulty with implementation B is that the special purpose processor must not allow any of the instructions issued to it be allowed outside of the integrated circuit, or else the integrity of the one-way function would be compromised.

For a nice description of how the RSA team implemented a one-way function, please visit the Internet site:
http://www.orst.edu/dept/honors/makmur/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No: 09/767,606   )   Attorney
)   Docket Number: 10001436-1
Filed: January 22, 2001   )
)   Group Art Unit: 2136
Inventor: Kenneth Smith   )
)   Examiner: B. Hoffman   RECEIVED
Title: Method Of Maintaining Integrity)   CENTRAL FAX CENTER
         Of An Instruction Or Data Set)
)   OCT 0 4 2004
)
)
_____)

October 4, 2004

DECLARATION UNDER 37 C.F.R. § 1.131

I , Steven R. Ormiston, make the following declaration.

1.   I am a registered patent attorney representing Hewlett-Packard
Company. From about April 2000 until August 2002 I served as the Outsourcing
Manager for HP's patent department at the HP site in Boise, Idaho. During that
time, I was responsible for managing the assignment to outside counsel and the
filing of hundreds of patent applications each year based on invention disclosures
generated by inventors at the Boise site.

2.   The pre-filing documents evidencing some of the events described
below and ordinarily maintained by HP were destroyed when the hardcopy file for
the above captioned patent application was recently scanned into an electronic file
and then discarded.

3.   The following events occurred in this case between the time the
Invention Disclosure document was submitted by the inventor and the time the
application was filed, just as they did in every case processed by HP in the early
2000s.

The Invention Disclosure was reviewed by an HP patent review committee
and approved for filing a patent application.

The inventor was notified of the committee's decision and that the case would
be assigned to an outside patent attorney for preparing the patent application.

Declaration of Steven Ormiston
Serial No. 09/767,606   -1-

A Request for Quote was sent to an outside patent attorney along with the Invention Disclosure requesting that the attorney submit a quote for the cost to prepare a patent application for the invention.

The outside patent attorney's quote was reviewed by HP in-house counsel and, when it was found to be acceptable, a contract was awarded to the outside patent attorney to prepare the patent application.

The outside patent attorney interviewed the inventor, prepared a first draft patent application and submited the first draft to the inventor for review.

The inventor reviewed the first draft patent application and returned it to the outside patent attorney with comments and changes, if any.

The outside patent attorney revised the patent application and submited a second draft patent application to the inventor for review.

The inventor approved the second draft patent application (or made comments and changes, in which case the draft/review process was repeated).
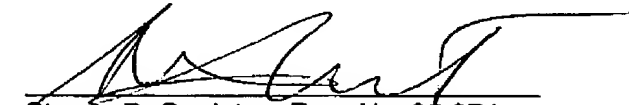
The outside patent attorney submited the inventor approved draft patent application to HP legal for review.

An in-house HP patent attorney reviewed the inventor approved draft patent application and approved the application for filing (or returned the application to the outside patent attorney with comments and changes, in which case the review process was repeated).

Once the patent application was approved by HP legal, the Declaration was prepared and the inventor signature obtained and then the application was filed with the U.S. Patent Office.

I declare that all statements made in this Declaration of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the patent application or any patent issued on that application.

10-4-2004
Date

Steven R. Ormiston, Reg. No. 35,974

Declaration of Steven Ormiston
Serial No. 09/767,606   -2-